Chrystal Chern, PhD

Postdoctoral Fellow, UC Berkeley
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RESEARCH INTERESTS

- Detection of mechanical misbehavior from inverse analysis of motion data
- Dynamical systems, structural health monitoring
- Professional and research readiness outcomes of higher education programs

EDUCATION

University of California, Berkeley 2024

PhD | Structural Engineering, Mechanics, and Materials. GPA: 3.89/4.00

Thesis: *Digital Twin Framework for Vibration-Based Structural Health Monitoring*

Minors: Statistics, Data Science

Major focus: structural mechanics and dynamics, linear and nonlinear structural analysis and finite element methods, and performance-based earthquake engineering and design.
Minor focus: artificial intelligence, machine learning, control systems, and scientific computing.

University of California, Berkeley 2019

MS | Structural Engineering, Mechanics, and Materials

Final Report: *Deep Learning for Transmission Tower Structural Health Monitoring in Small Datasets*

Massachusetts Institute of Technology 2016

BS | Mechanical Engineering

RESEARCH EXPERIENCE

Postdoctoral Fellow, UC Berkeley 2024 – Present

STructural Artificial Intelligence Research (STAIR) Lab, PEER/Berkeley

- Analyzing **system identification prediction residuals** and **modal clustering** for continuous monitoring of structural health
- Applying **inverse dynamic analysis** to **coupled biomechanical motions**
- Resolving **decoupling** ambiguity and inherent **instability** in **quantitative metrics** of mechanical behavior
- **Supervising** graduate and undergraduate student research

Berkeley Discovery Initiative

- Developed and implemented an **interdisciplinary research cluster model** for student-led innovation, creation, and practice-based learning
- **Assessed program impact** and **reach** in undergraduate self-efficacy
- Developed graduate student research autonomy through **tiered mentorship**
- Collaborated to **raise $170k of continuing funding** for Discovery Hubs

Graduate Student Researcher, UC Berkeley 2019 – 2024

STructural Artificial Intelligence Research (STAIR) Lab, PEER/Berkeley

Bridge Rapid Assessment Center for Extreme Events (BRACE2)

- Development of **CA's dynamic web-based health monitoring platform**
- **System identification** and **finite element modeling** of bridges and buildings

Structural ImageNet

- Deep learning image classification for structural health monitoring

Feature Engineering for Structural Health Monitoring

- Damage classification for augmented structural response history datasets

TEACHING AND MENTORSHIP

L&S 110 – Brilliance of Berkeley Spring 2026

Lecturer

- **Open and close** each class; assign **grades**, **advise** students, prepare **course materials**, facilitate **discussions**.
- Serve as **point of contact** for speakers. **Supervise** student readers.

SEMM Graduate Program Primer Boot Camp (**UC Berkeley**) Fall 2025

Lead organizer, founder and instructor

- Delivered **lectures** for an introduction to common theory and field-specific conventions for the incoming graduate student class.
- **Organize** seven (7) doctoral students to co-deliver lectures, **lunches**, and **readings**.

MAS-E ENGIN 235-A – Python for Engineers (**UC Berkeley**) Fall 2024, Spring 2025

Teaching Assistant

- Prepared **laboratory assignments**; developed **autograding code**
- Reviewed and edited **lectures** and **quizzes**

E7 – Computer Programming for Scientists and Engineers (**UC Berkeley**) Spring 2024, Fall 2023, Spring 2019

Graduate Student Instructor (GSI)

- Delivered **discussion lectures, worksheets**, and **laboratory assignments**
- Provided students with guidance in **office hours**
- Delivered exam **review session** lectures and **graded exams**

CE249 – Experimental Methods in Structural Engineering (**UC Berkeley**) Dec 2024

Guest Lecturer

System Identification of Vibration Data using Computer Vision

CEE Scholars Research Program (**UC Berkeley**) 2024 – Present

Research Mentor

- Introduced five (5) undergraduate students to research through semester-long **research projects** in structural health monitoring and vibration analysis.
- Provide students with academic and professional **mentorship**.

SEMM Mentoring Program (**UC Berkeley**) 2023 – 2024

Academic Mentor

- Provide first-year MS students academic and professional **mentorship**.

HIGHER EDUCATION ADMINISTRATION

Berkeley Discovery Initiative 2024 – Present

Program Strategist, Research Mentorship and Student Impact

Future of Higher Education Postdoctoral Fellow

- Co-developed and administered the inaugural Discovery Research Hub for the Kavli NanoScience Institute (ENSI), managing a **tiered mentorship research program**, now expanded to six (6) separate Hubs hosting over 30 graduate fellows and 140 undergrads in AY (academic year) 2025-26.
- Support implementation of nine (9) curricular pilots, expanding **hands-on research and practice** to over 200 students in AY 2024-25.
- Lead quantitative and qualitative **assessment** efforts for curricular pilots and Discovery Hubs by developing and analyzing surveys and focus groups, leveraging the data to secure additional funding and demonstrate impact to stakeholders. Metrics of impact include undergraduate student self-efficacy and original research, and graduate student leadership skills.
- Designed and delivered a **leadership training series** to graduate student fellows, providing them with essential skills in mentorship, pedagogy, and program administration. The series is being delivered to over 30 fellows and 140 undergraduate scholars in AY 2025-26.
- Contributed to **public relations and outreach** by collaborating on website pages, promotional videos, reports, and social media campaigns.
- Managed **program budgets and financial planning** for the Discovery Research Hubs and curricular pilots, with an annual budget of approximately $150k (Hubs) and $100k (curricular pilots).

PROFESSIONAL ENGINEERING

Simpson Gumpertz & Heger Inc. Washington, DC

Building Technology, Staff I 2016 – 2018

- Parametric energy, daylighting, thermal analysis of curtain walls
- Condensation sensitivity and thermal analysis of curtain wall, skylight, and cladding assemblies in 2D and 3D
- Hygrothermal modeling and analysis of exterior envelopes
- Infrared thermography survey and analysis
- Construction administration and construction document review
- Water penetration resistance and air infiltration testing
- Wind load analysis of components and cladding

Dassault Systèmes SOLIDWORKS Corp. Woodland Hills, CA

Engineering Intern 2014

- User issue investigation in Computer Aided Design and Finite Element Analysis for the SOLIDWORKS 2015 Beta program
- SOLIDWORKS technical support knowledge base renovation

PUBLICATIONS

Journals

Chrystal Chern and Khalid Mosalam (2026). *Modal Clustering for Digital Twinning of Civil Infrastructure*. Journal of Engineering Mechanics. In preparation.

Naiqi Guo, Chrystal Chern, and Khalid Mosalam (2026). *Detecting Inelasticity in Seismic Data with Time Response System Identification.* Mechanical Systems and Signal Processing. In preparation.

Chrystal Chern and Oliver O'Reilly (2025). *Resolving Ambiguous Modes in Damped Linear Mechanical Systems.* Journal of Sound and Vibration. Submitted for publication.

Sifat Muin, Chrystal Chern, and Khalid Mosalam (2024). *Human-Machine Collaboration Framework for Bridge Health Monitoring*. Journal of Bridge Engineering, 29(7), 04024041.

Conferences

Chrystal Chern, Claudio Perez, and Khalid Mosalam (2025). *Structural Response Prediction from Learned System Realization Matrices*. 11th International Conference on Experimental Vibration Analysis of Civil Engineering Structures (EVACES).

Chrystal Chern and Khalid Mosalam (2024). *Cross-Sectional Study of Physics-Informed Bridge Health Identification*. International Association of Bridge Earthquake Engineering (IABEE) Fourth International Bridge Seismic Workshop (4IBSW) Proceedings.

Sifat Muin, Chrystal Chern, and Khalid Mosalam (2020). *Human-Machine Collaboration Framework for Bridge Health Monitoring.* SMIP20 Seminar on Utilization of Strong-Motion Data Proceedings, Page 100-127.

Software

Chrystal Chern, Claudio Perez, and Khalid Mosalam (2024). *mdof: 0.0.16-alpha* (0.0.16-alpha). Zenodo. https://doi.org/10.5281/zenodo.11660201

Reports

Chrystal Chern. *Digital Twin Framework for Vibration-Based Structural Health Monitoring*. PhD Dissertation, UC Berkeley Civil and Environmental Engineering.

Chrystal Chern, Claudio Perez, and Khalid Mosalam. *BRACE2: Bridge rapid assessment center for extreme events, Phase I Final Report*. State of California Department of Transportation Technical Report No. CA24-3703.

Chrystal Chern. *Deep Learning for Transmission Tower Structural Health Monitoring in Small Datasets*. MS Research Report.

PRESENTATIONS

Chrystal Chern, Claudio Perez, and Khalid Mosalam. *Response History Reconstruction from Learned System Matrices for Structural Health Monitoring*. 11th International Conference on Experimental Vibration Analysis of Civil Engineering Structures. — July 2025

Chrystal Chern and Khalid Mosalam. *Computational Tools for Structural Health Monitoring at Scale*. Poster, 2025 NHERI (Natural Hazards Engineering Research Infrastructure) Computational Symposium. — Feb 2025

Chrystal Chern and Khalid Mosalam. *Cross-Sectional Study of Physics-Informed Bridge Health Identification.* International Association of Bridge Earthquake Engineering (IABEE) Fourth International Bridge Seismic Workshop (4IBSW). — Aug 2024

Claudio Perez, Chrystal Chern, and Khalid Mosalam. *BRACE2: Bridge Rapid Assessment Center for Extreme Events*. Oral presentation at project Phase I final meeting with California Department of Transportation. — Jan 2024

Claudio Perez, Chrystal Chern, and Khalid Mosalam. *BRACE2: Bridge Rapid Assessment Center for Extreme Events*. Poster, PEER Annual Meeting. — Aug 2023

Sifat Muin, Chrystal Chern, and Khalid Mosalam. *Human-Machine Collaboration Framework for Bridge Health Monitoring*. Poster, EERI Annual Meeting. — Mar 2021

Khalid Mosalam, Sifat Muin, & Chrystal Chern. *Human-Machine Collaboration Framework for Bridge Health Monitoring*. Oral Presentation, SMIP20 Seminar on Utilization of Strong-Motion Data. — Oct 2020

Chrystal Chern, Sifat Muin, & Khalid Mosalam. *Human-Machine Collaboration Framework for Bridge Health Monitoring*. Poster, PEER Annual Meeting. — Jan 2020

AWARDS AND HONORS

UC Berkeley Future of Higher Education Postdoctoral Fellow	2024 – Present
NSF Graduate Research Fellow	2020 – 2024
MIT Priscilla King Gray Public Service Center Expedition Grant	2015
Intel Scholarship	2012

PROFESSIONAL ORGANIZATIONS

Member, EERI (Earthquake Engineering Research Institute)	2023 – 2024
Member, NIBS (National Institute of Building Sciences)	2017

PROGRAMMING

Languages deployed in production: Python, Bash, Tcl, HTML/CSS, JavaScript
Additional languages: MATLAB, R, C, Rust

SIMULATION TOOLS – mechanical and thermal finite element analysis

xara; OpenSees; DIANA; AutoCAD & Revit; Rhinoceros 3D + Grasshopper; LBNL THERM 2D thermal analysis; BLOCON Heat3 3D thermal analysis; Fraunhofer IBP WUFI 1D transient hygrothermal analysis; LBNL WINDOW glazing system analysis; Certified SOLIDWORKS Professional; Certified SOLIDWORKS Associate – Simulation; SOLIDWORKS Flow Simulation & Sustainability

LANGUAGES – English, Mandarin Chinese, Spanish

SERVICE AND LEADERSHIP

SEMM Graduate Program Primer Boot Camp (UC Berkeley) Fall 2025
Lead organizer, founder and instructor. Host introductory lessons to MS students.

UC Berkeley SEMM 2024 – Present
Guided five (5) graduate students through independent study research projects.

UC Berkeley CEE Scholars Research Program Mentor 2024 – Present
Research mentor to five (5) undergraduate students

UC Berkeley SEMM Mentoring Program 2023 – 2024
Academic, career, and research mentor to two (2) first-year MS students

EERI, UC Berkeley Student Chapter 2023 – 2024
Treasurer

UC Berkeley SEMM-DSR (Doctoral Students and Researchers) 2022 – 2024
Founder, President, Treasurer, Journal Club Director

UC Berkeley Graduate Assembly Alternate Delegate 2023 – 2024
Graduate student representative for Civil and Environmental Engineering

UC Berkeley Graduate Assembly Delegate 2022 – 2023
Graduate student representative for Civil and Environmental Engineering
Campus Affairs Committee member

Journal Reviewer 2022 – Present
Computers and Structures Journal
Computer-Aided Civil and Infrastructure Engineering Journal

Conference Moderator 2022
2022 PEER Researchers' Workshop, PEER Pitches Session

PEER Student Committee 2021 – 2022
Board Member, Founder and Director of Student Spotlight and PEER Pitches

SEAONC, UC Berkeley Student Chapter 2020 – 2022
PhD Student Advisor

MIT Engineers Without Borders 2014 – 2015
Malawi Project Manager, Fundraising Chair, Liwonde, Malawi

MIT Women's Initiative 2014
Undergraduate Presenter, Westland, MI

REFERENCES

Oliver M. O'Reilly – Postdoctoral Research Supervisor 2025
oreilly@berkeley.edu, (510) 642-0877
UC Berkeley Distinguished Professor of Mechanical Engineering
UC Berkeley Vice Provost for Undergraduate Education

Leslie R. Harlson – Postdoctoral Supervisor, Berkeley Discovery 2024 – Present
lharlson@berkeley.edu, (650) 814-8720
Berkeley Discovery Executive Director
UC Berkeley

Alessandra Lanzara – Postdoctoral Supervisor, Berkeley Discovery 2024 – Present
alanzara@lbl.gov, (510) 642-4863
UC Berkeley Charles Kittel Chair in Physics
Lawrence Berkeley National Lab Senior Faculty
Kavli Energy Nanoscience Institute (ENSI)
Berkeley Discovery Faculty Director

Khalid M. Mosalam – PhD Thesis Advisor, Postdoctoral Research Supervisor 2020 – Present
mosalam@berkeley.edu, (510) 375-9271
UC Berkeley Taisei Professor of Civil Engineering
Director, Pacific Earthquake Engineering Research (PEER) Center

Sanjay Govindjee – SEMM Graduate Program Primer Boot Camp Supervisor 2025
s_g@berkeley.edu, (510) 642-6060
UC Berkeley Distinguished Professor of Civil and Environmental Engineering
UC Berkeley Horace, Dorothy, and Katherine Johnson Professor in Engineering